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JP2002172739 A

MOISTURE PERMEABLE WATERPROOF SHEET AND WALL STRUCTURE

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**Application No. 2000370780 JP2000370780 JP, Filed 20001205,A1 Published 20020618Published
20020618**

Abstract: PROBLEM TO BE SOLVED: To provide a moisture permeable waterproof sheet which can be utilized for simply forming a wall structure, which can adjust humidity in an outer wall structure corresponding to the difference between indoor and outdoor humidities, in spite of a circumferential temperature change to prevent the generation of dew condensation in the outer wall structure.

SOLUTION: An unperforated resin film of which the moisture permeation resistance value measured based on JIS-A-6930 is 2-20 m²/h/mmHg/g and the thickness is 10- 50 μm is laminated to a reinforcing material sheet of which the moisture permeation resistance value measured based on JIS-A-6930 is preferably 0 m²/h/mmHg/g and extremely lower than that of the unperforated resin film.

Int'l Class: B32B02706; E04B00166

Claim(s)]

[Claim 1] The nonporous resin film whose moisture permeation resistance measured based on JIS-A -6930 is 2-20m²/h/mmHg/g and whose thickness is 10-50 micrometers, It is the moisture permeation waterproofness sheet with which the laminating of the reinforcing materials sheet which has low moisture permeation resistance is carried out, and it consists of the moisture permeation resistance of this nonporous resin film. By JIS-Z -0208 (the correcting method) The moisture permeation waterproofness sheet characterized by the moisture vapor transmission measured under the conditions of 40 degrees C and 90%RH being 100-200 g/m³ and 24hr.

[Claim 2] The moisture permeation waterproofness sheet characterized by carrying out the laminating of the nonporous resin film whose moisture permeation resistance measured based on JIS-A -6930 is 2-20m²/h/mmHg/g, and whose thickness is 10-50 micrometers, and the reinforcing materials sheet whose moisture permeation resistance measured based on JIS-A-6930 is 0m²/h/mmHg/g substantially, and changing.

[Claim 3] The moisture permeation waterproofness sheet according to claim 1 or 2 characterized by said nonporous resin film being a polyethylene film or a polyvinyl alcohol film.

[Claim 4] The moisture permeation waterproofness sheet according to claim 1 to 3 characterized by being the span bond nonwoven fabric with which said reinforcing materials sheet consists of a thermoplastics filament.

[Claim 5] Said damp proof course is box-frame construction characterized by being the moisture permeation waterproofness sheet according to claim 1 to 4 with which it is the box-frame construction equipped with a damp proof course between wall material and outer wall material, and said nonporous resin film countered wall material, and has been arranged.

[Claim 6] Said outer wall material is box-frame construction according to claim 5 characterized by having had the heat insulator and having arranged said reinforcing materials sheet in contact with this heat insulator.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the box-frame construction which used the moisture permeation waterproofness sheet in more detail as a damp proof course between the moisture permeation waterproofness sheet which can adjust the humidity within box-frame construction according to the humidity difference by the side of the outer wall of a structure, and a wall and an outer wall, and a wall about moisture permeability, waterproofness, and the compound sheet that has a mechanical strength.

[0002]

[Description of the Prior Art] The box-frame construction of a residence etc. is fundamentally formed from a column, the wall arranged inside the column, and the outer wall structure allotted to the outside of a column, and outer wall structure is allotted to the outside of the house lap material allotted to the outside of a column, and house lap material, and is fundamentally formed from the outer wall material which equipped the maximum outside with the outer wall finish layer.

[0003] And the moisture which is the phenomenon which happens especially in a cold district in winter while preventing the leakage of water from outer wall material to the interior of a wall and which is generated indoors passes a wall, and such outer wall structure enters the interior of outer wall structure, and is the structure aiming at preventing the phenomenon dew

under the effect of the cold open air, and preventing the dew-condensation phenomenon within the box-frame construction which happens by ***** in a summer.

[0004] The polyethylene sheet which 50-200 micrometers in the high moisture-proof waterproofness sheet of moisture permeation resistance, for example, thickness, and the moisture permeation resistance based on JIS-A -6930 are more than 170m²/h/mmHg/g (A sorts), or is 300m²/h/mmHg/g (B sorts) is specifically stuck on the wall side within outer wall structure, and the outer wall structure it was made not to let moisture pass at all indoors is used.

[0005] Moreover, by forming the aeration layer which usually has width of face of about 18mm between house lap material and outer wall material, the 1 open air and a wall are insulated, circulation of 2 air (the moisture generated from the interior of a room is included) is enabled, and the outer wall structure which can prevent invasion to the interior of a wall of 3 leakage of water is also used. Forming an aeration layer is widely performed by specifically attaching outer wall material in the longitudinal direction which used the bar for the external surface of house lap material, and was formed in it through the furring strip of two or more trains which has spacing suitably (for example, refer to JP,63-53412,U). Moreover, the house lap material which attached network material in the aeration tarpaulin front face is indicated by JP,63-53412,U and JP,6-27400,Y. The wall sheet in which the hot melt resin layer which prepared the air hole in the front face of the wall sheet which has permeability was formed is indicated by JP,60-152709,U further again.

[0006]

[Problem(s) to be Solved by the Invention] However, the outer wall structure which used the high moisture-proof waterproofness sheet of the conventional moisture permeation resistance for the damp proof course still has the problem that dew condensation arises, in box-frame construction from a rainy season term by ***** at the time of the high-humidity/temperature of a summer.

[0007] Moreover, if it is in the outer wall structure equipped with the conventional aeration layer, in order to prepare predetermined spacing between outer wall material and house lap material, the projection member according to the spacing must be separately attached in house lap material, therefore there is a problem that workability is bad.

[0008] Therefore, it is easy construction and outer wall structure where the function moreover demanded can be attained efficiently and effectively is desired strongly.

[0009] The technical problem of this invention is in spite of a surrounding temperature change to adjust humidity within box-frame construction according to the humidity difference of the interior of a room and the outdoors, and offer the moisture permeation waterproofness sheet which can use the box-frame construction which can prevent generating of dew condensation within box-frame construction in order to form by easy construction.

[0010]

[Means for Solving the Problem] In order that this invention person may solve such a technical problem, a nonporous resin film with low moisture permeation resistance, By carrying out the laminating of the reinforcing materials sheet which has the moisture permeation resistance far lower than the moisture permeation resistance and the outstanding mechanical strength of the nonporous resin film By being able to offer the moisture permeation waterproofness sheet which lowers a water vapor pressure from the interior of a room gradually within box-frame construction to the outdoors, and can form humidity inclination, and using such a moisture permeation waterproofness sheet so that the humidity difference of the interior of a room and the outdoors may be balancing gradually In spite of the surrounding temperature change, generating of dew condensation could be prevented and it found out that construction could moreover form easy box-frame construction.

[0011] Namely, the nonporous resin film whose moisture permeation resistance by which the

moisture permeation waterproofness sheet of this invention was measured based on JIS-A -6930 is 2-20m²/h/mmHg/g and whose thickness is 15-30 micrometers, It is the moisture permeation waterproofness sheet with which the laminating of the reinforcing materials sheet which has low moisture permeation resistance is carried out, and it consists of the moisture permeation resistance of a nonporous resin film. A moisture permeation waterproofness sheet By JIS-Z -0208 (the correcting method), it is characterized by the moisture vapor transmission measured under the conditions of 40 degrees C and 90%RH being 100-200g/m³ and 24hr.

[0012] Moreover, the moisture permeation resistance measured based on JIS-A -6930 is 2-20m²/h/mmHg/g, and the moisture permeation waterproofness sheet of other gestalten is characterized by carrying out the laminating of the nonporous resin film whose thickness is 15-30 micrometers, and the reinforcing materials sheet whose moisture permeation resistance measured based on JIS-A -6930 is 0m²/h/mmHg/g substantially, and changing.

[0013] Furthermore, the moisture permeation waterproofness sheet of other gestalten is characterized by the nonporous resin film being a polyethylene film or a polyvinyl alcohol film in the moisture permeation waterproofness sheet of one of the above.

[0014] The moisture permeation waterproofness sheet of other gestalten is characterized by being the span bond nonwoven fabric with which the reinforcing materials sheet consists of a thermoplastics filament in the moisture permeation waterproofness sheet of one of the above further again.

[0015] Moreover, the box-frame construction which is other gestalten of this invention is box-frame construction equipped with a damp proof course between wall material and outer wall material, and the damp proof course is characterized by being one of the above-mentioned moisture permeation waterproofness sheets with which the nonporous resin film countered wall material, and has been arranged.

[0016] In the above-mentioned box-frame construction, outer wall material is equipped with a heat insulator, and box-frame construction of other gestalten is characterized by having arranged the reinforcing materials sheet in contact with the heat insulator further again.

[0017]

[Embodiment of the Invention] The resin film used for the moisture permeation waterproofness sheet of this invention is a nonporous resin film whose moisture permeation resistance which had waterproofness and infiltration and was further measured based on JIS-A -6930 is 2-20m²/h/mmHg/g and whose thickness is 15-30 micrometers.

[0018] If the moisture permeation resistance of a film becomes out of range [the above], suitable humidity inclination cannot be formed within box-frame construction. It is within the limits of the moisture permeation resistance specified by this invention, and although the film which has suitable moisture permeation resistance is chosen in consideration of the concrete structure of box-frame construction, the moisture permeation resistance of the reinforcing materials sheet to combine, thickness, etc. so that humidity inclination can be formed within box-frame construction, moisture permeation resistance is 10m²/h/mmHg/g preferably.

[0019] Moreover, the thickness of a film is 10-50 micrometers, and is 15-30 micrometers preferably. If thickness is thinner than 10 micrometers, when using it for outer wall structure, homogeneity and reinforcement will be inadequate and it will be easy to produce a tear. On the other hand, the moisture permeability as a sheet which will be obtained by carrying out the laminating of the reinforcing materials sheet if it exceeds 50 micrometers is spoiled, and it is not desirable from the field of workability and cost.

[0020] The water resistance of a film is measured by the water penetration test approach A method (low water pressure method) hydrostatic-pressure method in JIS-L1092, and is more than 500mmH(s)2O still more preferably more than 300mmH(s)2O preferably.

[0021] As resin which constitutes a film, it is thermoplastics and, specifically, polyolefine system resin, polyvinyl alcohol system resin, polystyrene system resin, polyamide system

[illegible]

[0023] Specifically, re-S&S is due to the fact that the non-covered firms, which are satisfied of the demand of the market, do not face any significant resistance. In spite of the fact that the firms are not willing to invest more, and the market is not covered, the non-covered firms are not willing

10025. Although the tensile strength, the yield strength, and the elongation of the
 10026. There was also a high gas permeation coefficient, which was about 100 times
 10027. sure and the permeation coefficient was about 100 times that of the other
 10028. the speed of the reaction was about 100 times that of the other
 10029. being about 100 times that of the other
 10030. of the reaction was about 100 times that of the other
 10031. was about 100 times that of the other
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 10040. was about 100 times that of the other

[0027] The flash plate spinning nonwoven fabric which combined the reticulated continuous fiber which consists of a super-thin fiber element and which has toughness, water pressure-proof [quantity], moisture permeability, and permeability with high intensity is indicated by JP,40-28125,B, JP,41-6215,B, JP,42-19520,B, and JP,43-21112,B by solidifying extending a polymer as a flash plate spinning nonwoven fabric, for example using the solvent gasified at the time of the polyolefine of a fiber formation nature polymer, and spinning.

[0028] The example of a melt blow spinning nonwoven fabric is the melt blow super-thin fiber nonwoven fabric manufactured by fusing a hydrophobic polymer constituent using usual melt blow spinning equipment, making the constant rate of a melting polymer breathe out from a die, spinning and conveying the melting polymer by the high-pressure gas style as a super-thin fiber style with an average fiber diameter of about 0.1-5.0 micrometers, and accumulating the fiber style on an uptake object. When using it with a single nonwoven fabric, it is average weight 30 - 500 g/m², and when using it, carrying out the laminating of the weight of this nonwoven fabric to other Takamichi temperament sheets, it is average weight 15 - 200 g/m². The obtained nonwoven fabric processes the whole surface for a calendering, a press, or a heat press at least, gives the processing agent eburation or for carrying out partial weld and raising a water resistance if needed, and uses it as a high water resisting property nonwoven fabric sheet. In this invention, the synthetic fiber paper used as a moisture permeation waterproofness sheet consists of a super-thin staple fiber with a diameter of 0.1-5.0mm, or a pulp-like object and a synthetic fiber, and is the web material manufactured by heat-and-pressure calendering after paper making. Furthermore, the web material which the thing which comes to apply to such a web material drugs and resin, such as the water repellent which raises waterproofness and resins, an ultraviolet ray absorbent which raises weatherability and light stabilizer, an antioxidant which raises endurance, and a surface protective agent, and the component which constitutes a web material were made to contain such an additive, and was manufactured is also contained in a synthetic fiber paper.

[0029] as the example of the resin sinking-in fiber object used as a moisture permeation waterproofness sheet in this invention -- JP,60-47955,B -- moisture permeability and waterproof coating -- the porous-waterproofing nature nonwoven fabric obtained by the ground's coating JP,5-85672,B with the thermoplastics which contained the filler in the nonwoven fabric, and carrying out after [membrane formation] calendering is indicated.

[0030] A nonporous resin film and a reinforcing materials sheet are joined by the well-known approach which does not spoil the moisture permeation resistive characteristic determined with both combination, and a moisture permeation waterproofness sheet is formed. As the general approach of junction, there are sewing, dot adhesion, complete adhesion, ultrasonic bonding, heat welding, etc. The knockout muscle laminating method of a hot melt agent, a spray method, the extrusion porous coat method, fine-particles spraying, the heat fixing method of a hot melt agent, etc. can be used further again. The desirable junction approach is a spray method which carries out dot adhesion of the hot melt agent.

[0031] When a resin film and a reinforcing materials sheet carry out direct coating of the thermoplastics, such as polyurethane, polyester, and a polyamide, by the well-known approach on a reinforcing materials sheet, a laminating may be carried out and a moisture permeation waterproofness sheet may be formed.

[0032] The thickness of the moisture permeation waterproofness sheet of this invention is 150-400 micrometers preferably. If thinner than 150 micrometers, it will be easy to produce a

tear, and if it exceeds 400 micrometers, airtight reservation of a superposition part is not suitable for implementation in a high airtightness residence more difficult.

[0033] The moisture vapor transmission with which the moisture permeability of the moisture permeation waterproofness sheet of this invention was measured by JIS-Z -0208 (the correcting method) under the conditions of 40 degrees C and 90%RH is 100-200 g/m² and 24hr. When it separated from this range and uses as a damp proof course of box-frame construction, it becomes impossible to lower a water vapor pressure, and dew condensation will arise within box-frame construction especially in a sultry summer so that humidity inclination cannot be formed in the outdoors from the interior of a room, therefore humidity may be balancing gradually.

[0034] When using it for an application which is put to direct rain although especially a water resistance is not restricted since it is not put to direct rain when using the moisture permeation waterproofness sheet of this invention for outer wall structure, it is a water penetration test JIS. It is needed that the water resistance measured by L-1092A law (low water pressure method) is 2000mmH(s)20.

[0035] The moisture permeation waterproofness sheet of this invention needs to have suitable reinforcement according to the purpose of use. When using it for outer wall structure, it is desirable that the ***** maintenance strength measured up by JIS-A -6930 is Kgf 2.5/1.9. Furthermore, it is desirable that the retention to the original ** face needle maintenance strength of the reinforcement measured by JIS-A -6930 after alkali immersion is also 80% or more.

[0036] The box-frame construction which is other gestalten of this invention is equipped with the above-mentioned moisture permeation waterproofness sheet as a damp proof course between wall material and outer wall material. The nonporous resin film counters wall material, and a moisture permeation waterproofness sheet is arranged. Preferably, outer wall material is equipped with a heat insulator, and the reinforcing materials sheet of a moisture permeation waterproofness sheet is arranged in contact with the heat insulator.

[0037] The desirable box-frame construction is as follows. The wall space formed of a column, a gatepost, etc. is filled up with heat insulators, such as glass wool. In case interior material is stuck on the inside side, a moisture permeation waterproofness sheet is arranged so that a nonporous resin film may touch the rear face of interior material. Subsequently, it arranges so that the reinforcing materials sheet of a moisture permeation waterproofness sheet may touch a heat insulator, and on the surface of a heat insulator, saposhnikovia root paper and mortar underbed material are stretched, and one by one, after attaching a lath network further, box-frame construction is formed by applying mortar. Generally as for the approach of fixing this box-frame construction in one, the tacker stop or the adhesion stop is adopted. Moreover, beforehand, the moisture permeation waterproofness sheet of larger size than a heat insulator is arranged to a heat insulator as mentioned above, and is attached in it, and after arranging so that the sheet may lap at the edge in case the wall space described previously is filled up with a heat insulator, the approach of fixing to box-frame construction by the approach of a tacker etc. can also be used. As mortar underbed material, there is no absorptivity, bond strength with mortar is large, and as long as it has the outstanding pinholing seal nature and can raise the waterproofness of the whole outer wall structure, what kind of well-known thing may be used. Moreover, since the surroundings of aperture opening are a location where permeation of storm sewage tends to take place when waterproofing tape application has a mistake, it is desirable to use the well-known tarpaulin corresponding to the three dimension marketed, and to prevent a leak completely.

[0038] The moisture permeation waterproofness sheet of this invention can form humidity inclination between the insides and the outsides where the temperature separated by this differs from humidity, and it can lower a water vapor pressure so that humidity may balance

from a humid side gradually to a low side. Therefore, it is not restricted to box-frame construction, but the moisture permeation waterproofness sheet of this invention can also be used in the structure which needs such a function, for example, roof structure.

[0039]

[Example] Although an example is given to below and this invention is explained to it still more concretely, this invention is not limited only to this example.

[0040] The measuring method of the physical properties of the nonporous resin film used in the following examples, a reinforcing materials sheet, and a moisture permeation waterproofness sheet is as follows.

A. Water pressure JIS-proof L-1092 It measured by 4.1.1.A law (low water pressure method).

B. Moisture vapor transmission JIS It measured under 40 degrees C of Measuring conditions, and 90%RH by Z-02081 law.

C. Moisture permeation resistance JIS It measured by A-6930 law.

D. It is JIS in **** needle maintenance strength. It measured by A-6930 law.

E. Reinforcement JIS after alkali immersion It measured by A-6930 law.

[0041] (Examples 1-2) the polyvinyl alcohol film (15-micrometer thickness) by the Nippon Synthetic Chemical Industry Co., Ltd. whose moisture vapor transmission is 100-200 g/m² and 24hr as a nonporous resin film -- using -- and As a reinforcing materials sheet, using the Du Pont polypropylene span bond nonwoven fabric "ZABAN (trademark)" (weighing capacity 45 g/m²), both were joined by dot-like adhesion (the solid content coating weight 5 - 10 g/m²) of a polyurethane system hot melt agent, and the layered product (moisture permeation waterproofness sheet) was manufactured. The eyes of the obtained compound sheet are 84 g/m², and had flexibility and toughness. Moreover, moisture permeation resistance was 10m²/h/mmHg/g, moisture vapor transmission was hr 2/24 127.5 g/m, and water pressure-proof was more than 2000mmH(s)2O. The physical properties of a moisture permeation waterproofness sheet are shown in Table 1.

[0042] Thus, the box-frame construction which prepared the aeration layer which has width of face of about 25mm, combining the interior material and the glass wool heat insulator of 100mm thickness which are shown in Table 2, saposhnikovia root paper, and a sheathing material one by one between saposhnikovia root paper and a sheathing material was formed, using the obtained moisture permeation waterproofness sheet as a damp proof course.

[0043] As a result of using the formed box-frame construction in the wooden residence built in the period from July, 1998 to March, 2000, and Tsuchiura, Ibaraki and observing generating of summer mold dew condensation and winter form dew condensation, neither of dew condensation took place at all.

[0044] (Examples 3-4) The compound sheet was manufactured like the example 1. The box-frame construction which does not have an aeration layer was formed combining the interior material and the glass wool heat insulator of 100mm thickness which are shown in Table 3, saposhnikovia root paper, and a sheathing material one by one using the obtained compound sheet as a damp proof course.

[0045] As a result of observing generating of summer mold dew condensation and winter form dew condensation like an example 1 using the formed box-frame construction, neither of dew condensation took place at all.

[0046] (Examples 1-3 of a comparison) The outer wall structure of having an aeration layer like an example 1 was formed 15 micrometers and the moisture vapor transmission of 9.4g/m as a damp proof course except having used the polyethylene film which is hr 2/24.

[0047] As a result of observing generating of summer mold dew condensation and winter form dew condensation like an example 1 using the formed box-frame construction, dew condensation of a winter form was also observed also for dew condensation of summer mold.

[0048] (Examples 4-6 of a comparison) The box-frame construction which does not have an

aeration layer like an example 3 was formed except having used 15 micrometers and the polyethylene film which is moisture-vapor-transmission 9.4 g/m²/24hr as a damp proof course.

[0049] As a result of observing generating of summer mold dew condensation and winter form dew condensation like an example 1 using the formed box-frame construction, dew condensation of a winter form was also observed also for dew condensation of summer mold.

[0050]

[Table 1]

試験項目	測定値	試験方法	測定値	試験方法
引張強度 縦 (Kgf/5cm) 横	22.0 18.2	JIS-L-1096	92.2% 88.5%	アルカリ浸漬後 JIS-A-6930
伸度 縦 (%) 横	34.6 62.7	JIS-L-1096	103.0% 84%	
引裂強度 縦 (Kgf) 横	2.7 3.9	JIS-L-1096 A-1 法	縦4.3 (Kgf) 横5.0 (Kgf)	つづら針保持強さ JIS-A-6930 (23℃)
破裂強度 (Kgf/cm ²)	6.9	JIS-P-8112		
厚み (mm)	0.23	JIS-L-1096		
透湿抵抗値 (m ² /h/mmHg/g)	10	JIS-A-6930		
透湿度 (g/m ² /24hr)	127.5	JIS-Z-02081 40℃、90%RH		
耐水圧 (mmH ₂ O)	2000以上	JIS-L-1092 4.4.1.A 法 (低水圧法)		

[0051]

[Table 2]

通気層を有する壁構造

	内装材	断熱材	防湿層	防風紙	外装材	結露の有無
実施例 1	石膏ボード (9 mm)	PV-100 (商品名)	透湿防水性 シート	合板 タイベック	センチュリ ボード	無
実施例 2	石膏ボード (9 mm)	PV-100 (商品名)	透湿防水性 シート	タイベック	センチュリ ボード	無
比較例 1	石膏ボード (9 mm)	PV-100 (商品名)	P E	ダイライト タイベック	センチュリ ボード	有
比較例 2	石膏ボード (9 mm)	PV-100 (商品名)	P E	合板 タイベック	センチュリ ボード	有
比較例 3	石膏ボード (9 mm)	PV-100 (商品名)	P E	タイベック	センチュリ ボード	無

[0052]

[Table 3]

通気層を有さない壁構造

	内装材	断熱材	防湿層	防風紙	外装材	結露の有無
実施例 3	石膏ボード (9 mm)	PV-100 (商品名)	透湿防水性 シート	タイベック	センチュリ ボード	無
実施例 4	石膏ボード (9 mm)	PV-100 (商品名)	透湿防水性 シート	タイベック	ニチハボー ド	無
比較例 4	石膏ボード (9 mm)	PV-100 (商品名)	P E	タイベック	センチュリ ボード	有
比較例 5	石膏ボード (9 mm)	PV-100 (商品名)	P E	タイベック	モルタル	有
比較例 6	石膏ボード (9 mm)	PV-100 (商品名)	P E	タイベック	ニチハボー ド	有

[0053] The notation indicated to front Naka or a trade name, and its manufacturer are as follows.

PV-100: Glass wool Made from MAGU, trade-name MAGUSHIRUBA PORIKATTO
Tyvek: A trade name, the Du Pont flash plate span nonwoven fabric "Tyvek (trademark)"
Century board: -- a trade name and the Mitsui Wood System make -- a hard wood block cement board NICHIIHA board:trade name and the NICHIIHA make -- a hard board die light:trade name and DAIKEN volcanism glassiness double lamellae

[0054]

[Effect of the Invention] The moisture permeation waterproofness sheet by this invention can form humidity inclination between the insides and the outsides where the temperature separated by this differs from humidity, and it can lower a water vapor pressure so that humidity may balance from a humid side gradually to a low side. Therefore, the box-frame

construction also with easy construction which the problem of dew condensation does not produce can be offered irrespective of the climate of a method of construction or an area by preparing the damp proof course which consists of this moisture permeation waterproofness sheet between wall material and outer wall material.

[Translation done.]

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